

IS-F341 Software Engineering (II - 2020-21)

T15 & BITShare Portal

[BITShare application](#)

Student ID, Name Role (PO+DEV/SM+DEV/DEV)	Photo
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Section 1 – Project Overview

BITShare - A resource sharing portal

Sharing household items, sports equipment, books, medicines and so on is very common amongst the residents of the hostels in BITS Pilani Hyderabad Campus. Often, students can be seen going door to door, asking for certain items. It would be convenient if there was some way one could know if there is someone who has that item and is willing to let them borrow it. Also, a major source of frustration is when one loses track of their items that they have lent to their friends. This project develops a web portal that supports:

- Sharing and borrowing of items in an organized and traceable manner
- Users can post about items they possess, that they are willing to rent/lend and later delete them if they do not wish to lend anymore.
- Users can browse items by category, ratings and lender credibility
- Users may contact lenders and request items to borrow or reserve them for a future date.
- Borrowers to leave ratings on items they borrow.
- Users can view their entire lending and borrowing history
- Users can request for items they need on the request portal
- Favourite an item and view favoured items separately.
- Users can compare two items.

Section 2 – Existing Work System

AS-IS Work System Snapshot

Customers	Product/Services	
• Borrower	• Resources / Items	
Major Activities and Processes		
• Borrower recognises the need for an item or resource		
• Borrower searches for prospective lenders by contacting friends, visiting neighbouring hostel rooms and by posting on social media groups.		
• Borrower finds a lender.		
• Lender and borrower exchange contact details.		
• Lender lends the item to the borrower.		
• Lender contacts the borrower to return the item after the decided time.		
• Borrower returns the item.		
Participants	Information	Technologies
• Borrower • Lender	• Lender's contact details • Borrower's contact details • Item details	• Mobile phone • Social Media (Facebook, Whatsapp)

Problems/Challenges

Participant/Customer	Description of problems/challenges
Lender	It is difficult to keep track of one's items and who has borrowed what.
Lender	No incentives to rent out items
Borrower	Searching for prospective lenders is laborious and time consuming
Borrower	Have to often end up buying items that couldn't be found out because of lack of proper communication.
Non-participants	Unnecessary involvement and unwanted disturbance

User Personas

Rajesh (Borrower)	“Saving up as much as possible, whenever, wherever.”	
	<p>Capabilities:</p> <ul style="list-style-type: none"> ● Extroverted ● Smartphone user ● Active on social media 	<p>Goals/Objectives:</p> <ul style="list-style-type: none"> ● Wants to save time and money.
<p>Demographics:</p> <p>Age: 20 Education: B.E. 2nd year Work: Student Family: Bachelor Location: Hyderabad</p>	<p>Brief bio:</p> <p>Rajesh is a student from a not so well off family. He often finds the need to borrow textbooks, laboratory essentials and other items from his friends.</p>	<p>Frustrations/Pain points:</p> <ul style="list-style-type: none"> ● Often spends a lot of time requesting to borrow items from different people when in need. ● Many times he is unable to find and connect with people willing to lend such items.

Binod (Lender)	“Roses are red, violets are blue. Return my items, don’t take them with you”	
	<p>Capabilities:</p> <ul style="list-style-type: none"> • Smartphone user • Active on social media • Negotiation skills 	<p>Goals/Objectives:</p> <ul style="list-style-type: none"> • To put various items he owns to use. • To not lose track of things he has lent to others.
<p>Demographics:</p> <p>Age: 19 Education: B.E 2nd year Work: Student Family: Bachelor Location: Kanpur</p>	<p>Brief bio:</p> <p>Binod is a student with a habit of buying (often useless) things. These things often end up being left unused. He lends them away when he gets the chance to.</p>	<p>Frustrations/Pain points:</p> <ul style="list-style-type: none"> • Often unable to find and connect with people looking to borrow items. • Finds it difficult to keep a track of items lent to his friends.

Amaira (Borrower)	“Want the best out of whatever I can.”	
	<p>Capabilities:</p> <ul style="list-style-type: none"> • Tech savvy • Athletic and into sports 	<p>Goals/Objectives:</p> <ul style="list-style-type: none"> • To borrow items required for various activities that are only for one-time use, rather than buy them every time.
<p>Demographics:</p> <p>Age: 22 Education: 4th Year Work: Had a recent internship. Family: Bachelor Location: Dehradun</p>	<p>Brief bio:</p> <p>Amaira is very active and plays volleyball, football as well as basketball. She loves trying new things, but finds it difficult to procure necessary equipment. She looks to borrow from friends, otherwise is forced to buy.</p>	<p>Frustrations/Pain points:</p> <ul style="list-style-type: none"> • Often buys items for one time use, which is a waste of money. • Unable to connect with people willing to lend items she needs.

Sambhav (Hostel resident)	“DO NOT DISTURB”	
	<p>Capabilities:</p> <ul style="list-style-type: none"> ● Introverted ● Good at time management 	<p>Goals/Objectives:</p> <ul style="list-style-type: none"> ● To study peacefully. ● Avoid distractions.
<p>Demographics:</p> <p>Age: 18 Education: 1st year Work: Student Family: Bachelor Location: Ambala</p>	<p>Brief bio:</p> <p>Sambhav is a first year dualite who is withdrawn and not very sociable. He spends most of the day studying and does not like it when people knock on his door and disturb him.</p>	<p>Frustrations/Pain points:</p> <ul style="list-style-type: none"> ● Is disturbed by people frequently asking to borrow items.

Section 3 – System Scope

TO-BE Work System Snapshot (moderate support)

Customers	Product/Services	
<ul style="list-style-type: none"> • Borrower • Lender 	<ul style="list-style-type: none"> • Resource/items 	
Major Activities and Processes		
	<ul style="list-style-type: none"> • Lender posts about one or more items (along with relevant tags) he/she possesses that he/she is willing to lend or rent out (for a price of their choice). • Borrower recognises the need for an item or resource and finds the item by searching in the relevant category. • Borrower finds and contacts the lender (using contact details mentioned on their profile), negotiates terms of use and decides on a date of return. • Lender accepts the request, lends the item to the borrower and updates the status of the item in the portal to reflect the same. • Borrower returns the item to the lender at the decided time and pays the decided amount of money. • Lender updates the status of the item to reflect the same. • Borrower posts requests for items he needs on the request portal in case they do not find the item. • Users view their entire lending and borrowing history. 	
Participants	Information	Technologies
<ul style="list-style-type: none"> • Borrower • Lender 	<ul style="list-style-type: none"> • Lender's contact details • Borrower's contact details • Item details 	<ul style="list-style-type: none"> • Mobile phone • Social Media (Facebook, Whatsapp) • BITShare app

TO-BE Work System Snapshot (maximum support)

Customers	Product/Services	
<ul style="list-style-type: none"> • Borrower • Lender 	<ul style="list-style-type: none"> • Platform to find prospective borrowers/lenders • Resources/items 	
Major Activities and Processes		
	<ul style="list-style-type: none"> • Lender posts about one or more items (along with relevant tags) he/she possesses that he/she is willing to lend or rent out (for a price of their choice). • Borrower finds the item using the search feature by category, ratings and/or lender credibility. • Borrower favourites some items and views favourited items separately. • Borrower views lender's score(measure for quality and credibility) and compares items. • Borrower uses the chat feature within the app to contact the lender and negotiate terms of use and decide on a date of return. <p>Lender accepts the request, lends the item to the borrower and updates the status of the item in the portal to reflect the same.</p> <ul style="list-style-type: none"> • Borrower pays for using the item using a payment gateway or in-person. • Borrower returns the item to the lender after the decided time. • Lender updates the status of the item to reflect the same and leaves a rating, which contributes to the borrower's score (measure for credibility of the borrower). • Borrower leaves a rating on the item borrowed, which contributes to the lender score. • Borrower posts a request for an item on the request portal in case it does not exist or is not being lent. • Users view their entire lending and borrowing history. • Users may report inappropriate or offensive behaviour using a report feature. • Moderator addresses and resolves any such cases. 	
Participants	Information	Technologies
<ul style="list-style-type: none"> • Lender • Borrower • Moderator 	<ul style="list-style-type: none"> • Lenders' contact details • Borrowers' contact details • Item details • Moderator's details • Lenders' banking details • Borrowers' banking details 	<ul style="list-style-type: none"> • Mobile phone • BITShare app • Payment gateway • AI for recommending featured items

TO-BE Work System Snapshot (selected for project work)

Customers	Product/Services	
<ul style="list-style-type: none"> • Borrowers • Lenders 	<ul style="list-style-type: none"> • Resources 	
Major Activities and Processes		
<ul style="list-style-type: none"> • Lender posts about one or more items (along with relevant tags) he/she possesses that he/she is willing to lend or rent out (for a price of their choice). • Borrower finds the item using the search feature by category or tags. • Borrower favourites some items and views favourited items separately. • Borrower views lender's score(measure for quality and credibility) and compares different items. • Borrower contacts the lender using the contact details, negotiates terms of use and decides on a date of return. • Lender accepts the request, lends the item to the borrower and updates the status of the item in the portal to reflect the same. • Borrower returns the item to the lender at the decided time and pays the decided amount of money. • Lender updates the status of the item to reflect the same. • Borrowers leave ratings on items they borrow, which contributes to the lender's score(measure for credibility of the lender). • Users view their entire lending and borrowing history. • Borrower posts requests for items he needs on the request portal in case they do not find the item. 		
Participants	Information	Technologies
<ul style="list-style-type: none"> • Lenders • Borrowers 	<ul style="list-style-type: none"> • Lenders' contact details • Borrowers' contact details • Item details 	<ul style="list-style-type: none"> • Mobile phone • Social Media (Facebook, Whatsapp) • BITShare app

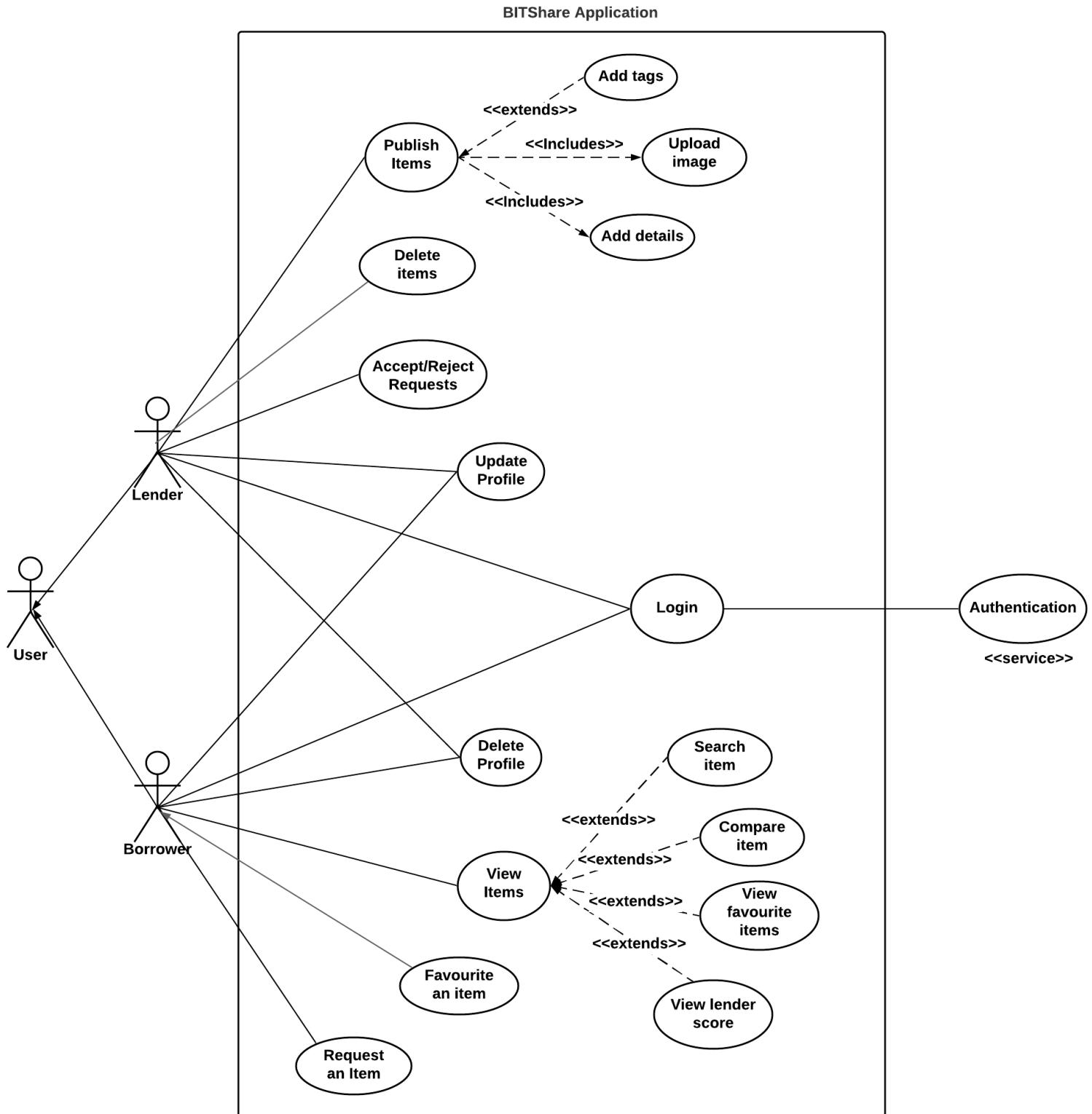
Section 3 – Product Backlog

As a	I want to	so that
User	update my profile with relevant details such as contact details, address, etc	others who view my profile can contact me.
Lender	publish my item(s)	others can view my items and request to borrow them.
Lender	add relevant tags to my items	Potential borrowers can search easily.
Lender	add a price to the items I choose to rent out	I get good incentives to lend my items.
Borrower	search for items by category and rating.	I can filter out unnecessary products and browse items to my liking.
Borrower	see what items are already reserved for what dates	I don't make a request on an item that has been reserved.
Borrower	compare items	I borrow what's best for me
Borrower	see the contact details of the lender	I can contact them for an item
Lender	update the status of items I am lending	borrowers do not request for an item I have already lent.
User	see my transaction history	I can keep track of items I have borrowed and/or lent.
Borrower	request for an item which is not available in the portal	Potential lenders can contact me for the same.
Borrower	be notified when items I have requested on the request portal become available	I can contact the lender.
Borrower	favourite an item and view favorited items separately	I can keep track of things I liked the most.

Borrower	leave a review on an item I have borrowed	successive borrowers are made aware of the quality of the item
Borrower	view other people's reviews on items	I can choose the best items.
Lender	to delete items	Nobody requests for an item I am not willing to lend any further.
User	delete my profile	I can remove my details from the application when I do not have use for it anymore.
Admin	see daily/monthly statistics on the dashboard	I can receive feedback and improve the portal.

Section 4 - Use case modeling

Use case diagram



Use case description # 1

Name	Add new item
Description	Lender adds a new item to the list of items they wish to lend or rent on the lend portal.
Actors	Lender
Trigger	Lender has an item which they would like to lend or rent.
Preconditions	Lender is logged in on the portal.
Postconditions	Lender's item has been added in the database.
Main course	<ol style="list-style-type: none"> 1. Lender navigates to the lend page and adds an item. 2. System prompts the user to enter the name and price of the item, relevant tags (which will be used by the System to identify it when a borrower makes a search) and also upload an image of the same. 3. Lender enters the required details and uploads a picture. (AC1) 4. System validates that the details match the required format. (AC2, AC3) 5. System adds the item to the database. (EX1) 6. System redirects the user to the dashboard.
Alternate courses	<p>AC1: Lender does not have a picture of the item</p> <ol style="list-style-type: none"> 1. Lender obtains a picture of the item. 2. Return to MC3. <p>AC2: Image file format is not supported</p> <ol style="list-style-type: none"> 1. System prompts the user to upload another image in one of the specified file formats. 3. Return to MC2. <p>AC3: Incorrect format or incomplete details</p> <ol style="list-style-type: none"> 1. System displays an error and prompts the user to re-enter the details. 2. Return to MC2.
Exceptions	<p>EX1: System fails to save the item in the database.</p> <ol style="list-style-type: none"> 1. System notifies that an error has occurred and terminates the process.

Use case description # 2

Name	Browse and inspect items
Description	Borrower browses items and views item details.
Actors	Borrower
Trigger	Borrower wants to view items to borrow.
Preconditions	Borrower is logged in on the portal
Postconditions	Borrower finds items they are interested in and views its details.
Main course	<ol style="list-style-type: none"> 1. Borrower navigates to the borrow section where all items are displayed. (AC1, AC2, EX1) 2. Borrower searches for an item on the browse page using the search bar. 3. System displays all the items which match the search parameter. 4. Borrower selects a particular item. (AC3) 5. System displays the details of the selected item.
Alternate courses	<p>AC1: Borrower wants to browse previously borrowed items.</p> <ol style="list-style-type: none"> 1. Borrower navigates to the previously bought items section. (EX2) 2. Return to MC4 <p>AC2: Borrower wants to browse his favourited items.</p> <ol style="list-style-type: none"> 1. Borrower navigates to the favourite items section. (EX3) 2. Return to MC4 <p>AC3: Borrower wants to compare items.</p> <ol style="list-style-type: none"> 1. Borrower navigates to the compare section and selects two items. 2. System displays the details of both items simultaneously for the user to compare. 3. Return to MC4.
Exceptions	<p>EX1: No item is available for borrowing in the borrow section.</p> <ol style="list-style-type: none"> 1. System displays an error that no items are currently available. <p>EX2: Borrower has never borrowed an item before.</p> <ol style="list-style-type: none"> 1. System displays an error that the borrowing history is empty. <p>EX3: Borrower has not favorited any items.</p> <ol style="list-style-type: none"> 1. System displays an error that no favourite items exist.

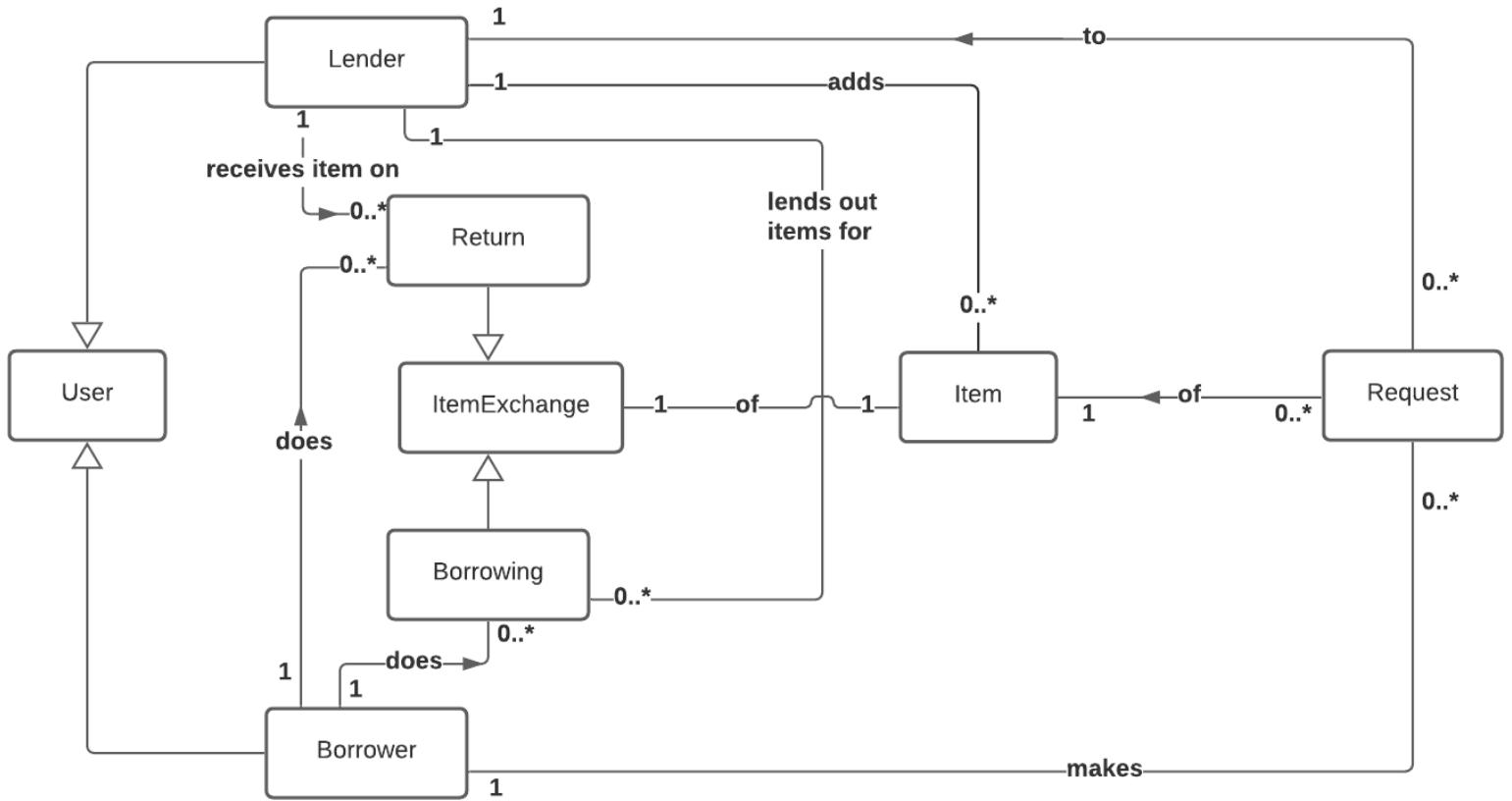
Use case description # 3

Name	Request item
Description	Borrower sends a request to the lender for an item.
Actors	Borrower
Trigger	Borrower wishes to borrow an item
Preconditions	1. Borrower is logged into the application. 2. Borrower has selected an item to borrow.
Postconditions	Borrower has sent a request to the lender.
Main course	1. Borrower requests an item from the lender through the portal. 2. System prompts the borrower to fill in the time period for which the item is required and terms of use (if any) 3. Borrower fills the time period and the terms of use. 4. System sends a request to the lender. (EX1, EX2) 5. System adds the item to the borrower's list of requested items. 6. System displays the item owner's contact details to the borrower.
Alternate courses	None
Exceptions	EX1: The item is unavailable during that time period due to it being borrowed by someone else or due to the lender deleting it. 1. System displays that the item is unavailable. EX2: Borrower doesn't want to borrow the item anymore. 1. Borrower cancels the borrow request. 2. System removes the request from Lender's requested items list

Use case description # 4

Name	Item is returned
Description	Lender receives his item back from the borrower after the decided time.
Actors	Lender
Trigger	Lender receives their item from the borrower.
Preconditions	Lender is logged in the application
Postconditions	System updates the status of the item.
Main course	<ol style="list-style-type: none"> 1. Lender confirms on the system that the item has been returned. 2. System prompts the lender to rate the borrower (used for calculating borrower score). 3. Lender enters the rating and leaves a review. (AC1) 4. Lender updates the status of the item on the portal to available. 5. System updates the database accordingly. (EX1)
Alternate courses	<p>AC1: Lender wants to skip filling the borrower score.</p> <ol style="list-style-type: none"> 1. Lender skips the same. 2. Return to MC4
Exceptions	<p>EX1: System fails to update the database.</p> <ol style="list-style-type: none"> 1. System notifies that an error has occurred and terminates the process.

Section 5 – Class diagram



Attributes and operations

Class name	Attributes	Operations
User	userID, name, email, password, hostelName, roomNumber, phoneNumber, loginStatus	checkIsRegistered(), register(), login(), verifyLogin(), updateUserProfile()
Lender	lenderScore	addItem(item), deleteItem(item), updateItem(item), acceptRequest(request), rejectRequest(request)
Borrower	borrowerScore	requestItem(item), deleteRequest(item), favouriteAnItem(item), unfavouriteAnItem(item)
Item	itemID, name, price, image, isBorrowed, rating, [tag]	searchItems(searchParameter), filterItems([tag]) compareItems(item, item)
Request	requestDate, isAccepted	createRequest(), removeRequest()
Item exchange	duration	calculateTotalPrice()
Borrow	borrowDate(when the item was borrowed)	checkIfBorrowDatePassed()
Return	returnDate(when the item was returned)	checkIfReturnDatePassed()

NoSQL documents

Collection name	Document Structure (field names)
User	userID, name, email, password, hostelName, roomNumber, phoneNumber, loginStatus
Lender	myItems[], lendItems[], lenderScore
Borrower	currentlyBorrowedItems[], favouriteItems[], previouslyBorrowedItems[], pendingRequests[], borrowerScore
Item	itemID, name, price, image, ownerID, isBorrowed, borrowerID, rating, tags[], requesterIDs[]
Request	lenderID, borrowerID, itemID, requestDate, isAccepted
ItemExchange	lenderID, borrowerID, itemID, duration
Borrow	borrowDate(when the item was borrowed)
Return	returnDate(when the item was returned)

Comments on embedding/referencing:

Borrower contains lists of references to Items such as currentlyBorrowedItems, favouriteItems and previouslyBorrowedItems. Item also references Lender through ownerID and Borrower through borrowerID.

Request and ItemExchange also reference Lender through lenderID, Borrower through borrowerID and Item through itemID.

Instead of referencing tags from Item, tags have been embedded into Item as they exist within the scope of the Item itself and do not need to be accessed otherwise.

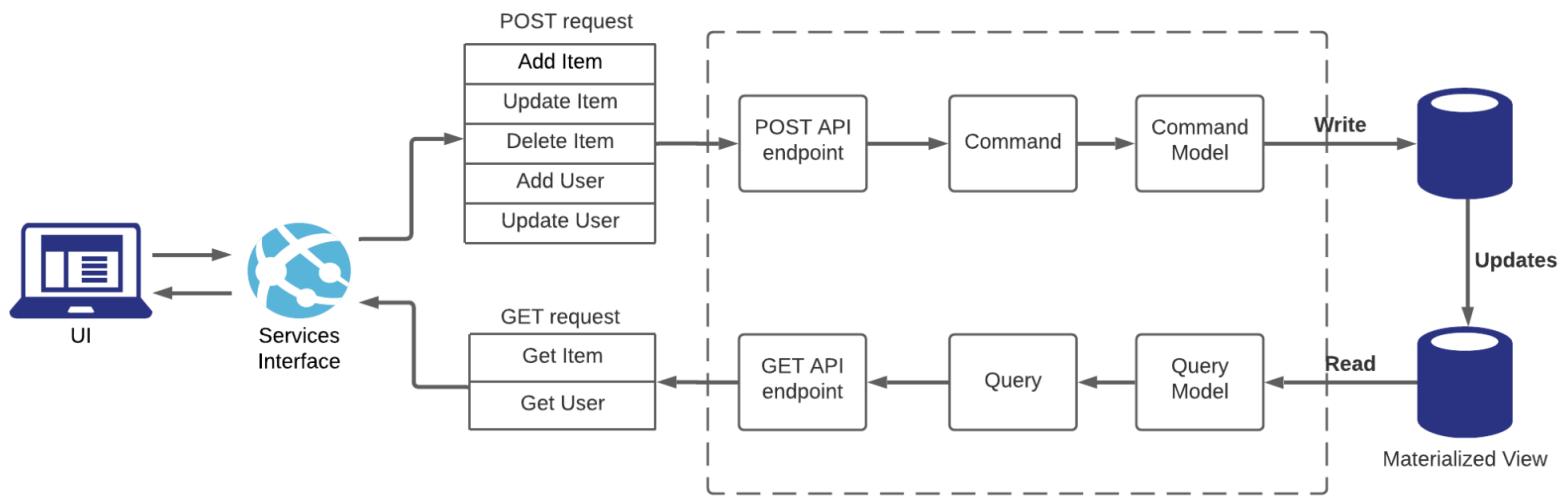
Comments on denormalizations made or avoided:

borrowerName, borrowerScore, itemName have been denormalized to request because while displaying the requests we only display the name, score of the borrower and the name of the item and we don't need other details of the borrower and the item.

itemName and other item details have not been denormalized in myItems of lender and currentlyBorrowedItems, favouriteItems, previouslyBorrowedItems of borrower as in these pages we need to display all the item details.

Section 6 – System Architecture

CQRS Architecture

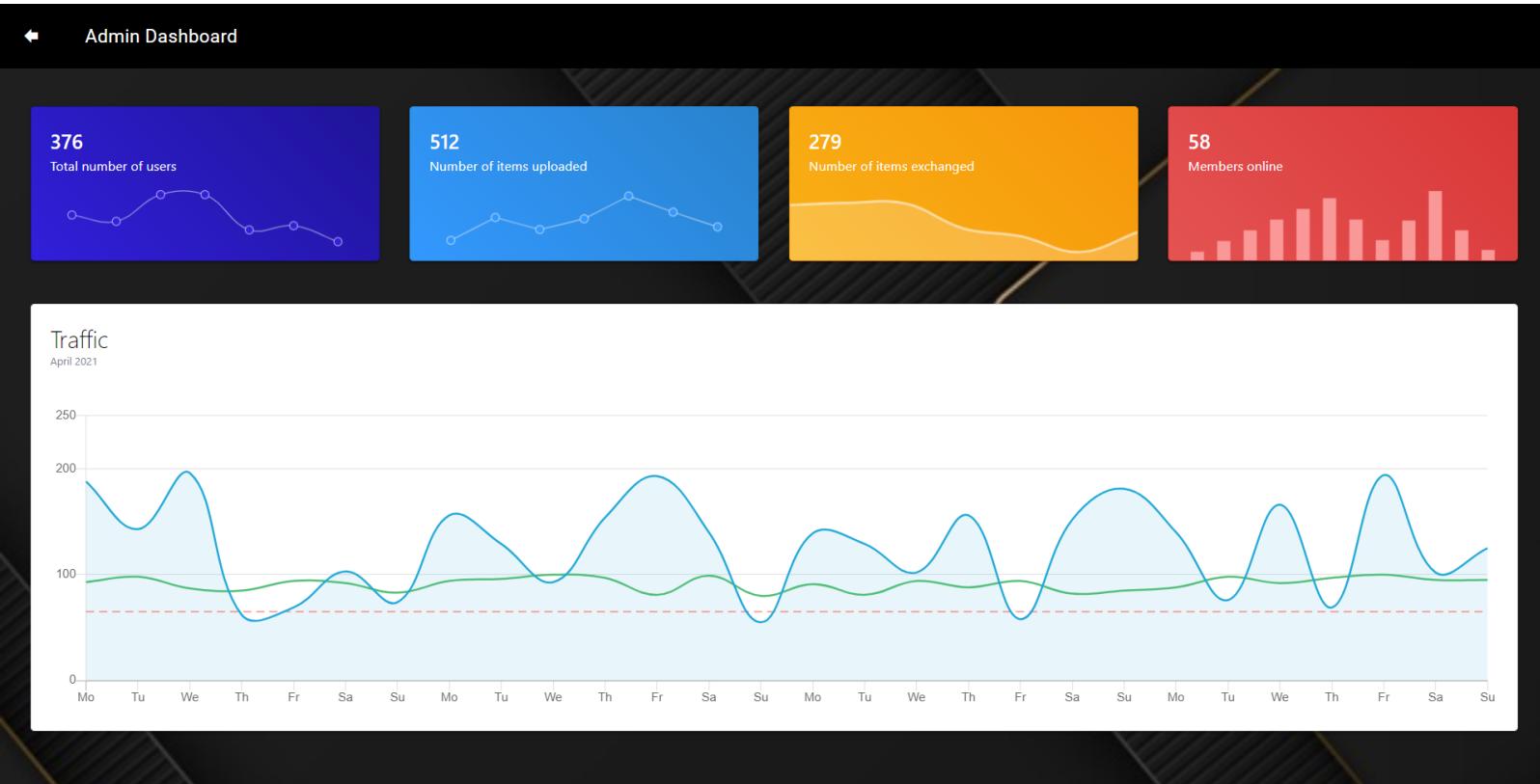


The Command and Query Responsibility Segregation (CQRS) architecture would be the most suitable architecture for the Web sharing portal.

The CQRS architecture detaches the query and update (command) operations into separate models. It can be seen that all of the actions supported by our Web-share application perform either one of these operations. Viewing items on the borrow page, lend page, favourite items page and so on require information from the database, while publishing item details, making and accepting requests as borrowers and lenders respectively, etc require updating the database. Adopting a CQRS architecture will thus maximize its performance, scalability, and security.

Section 7 – Dashboard

<Screenshot of dashboard that captures typical information provided to managers or decision maker type of users in your project case>



Section 8 – Conclusion

The aim of this project was to build a web application that facilitates sharing and borrowing of items among the hostel residents of BPHC in an organized and traceable manner. We have managed to create an application which allows users to post items they are willing to lend on the portal and later delete them. It allows lenders to keep track of their items and find potential borrowers. Borrowers can borrow items available on the lend portal as well as request items through the request portal.

The project was developed following Scrum methodology throughout and proved to be a very good learning experience for us. It allowed us to familiarize ourselves with many Software Engineering and Project Management techniques. The usage of Pivotal Tracker allowed us to easily track the progress of the project and helped us divide our workload (in the form of ‘user stories’) evenly across three sprints. Other tools provided by Pivotal Tracker, such as the Burnout Chart and the Project Velocity also helped us monitor the team’s efficiency. GitHub helped in collaborating with other team members.

We also learnt the importance of documentation and usage of various kinds of diagrams and charts. The usage of Activity diagrams, Domain models, Use-Case diagrams and Use-Case Descriptions allows the team to easily visualise and convey with each other how the project is to be made functional. Assigning different Personas to the team members also allows us to look at the project from many different aspects, hence allowing us to cover the needs of all major user types. Mind Maps and Wireframes using Lucidchart allowed us to design the UI such that it is comfortable for the users to use it. We also used Sonarcloud for checking and maintaining code quality. Using all of this in an actual project allowed us to understand the importance they hold in Project Management.

The project is limited in scale due to the System Architecture and Database currently used. To overcome this limitation, we have looked at the CQRS architecture, which will allow the upscaled version of the project to work efficiently. Also a possible improvement in this application would be the use of socket programming for real-time feed updation and real-time communication between the lenders and borrowers within the application.

Appendix A - Code Quality Reports

About This Project

No tags ▾

 13k
Lines of Code

JavaScript	 13k
CSS	265
HTML	45

Project Activity

April 25, 2021, 9:09 PM
not provided

[Show More](#)

Quality Gate

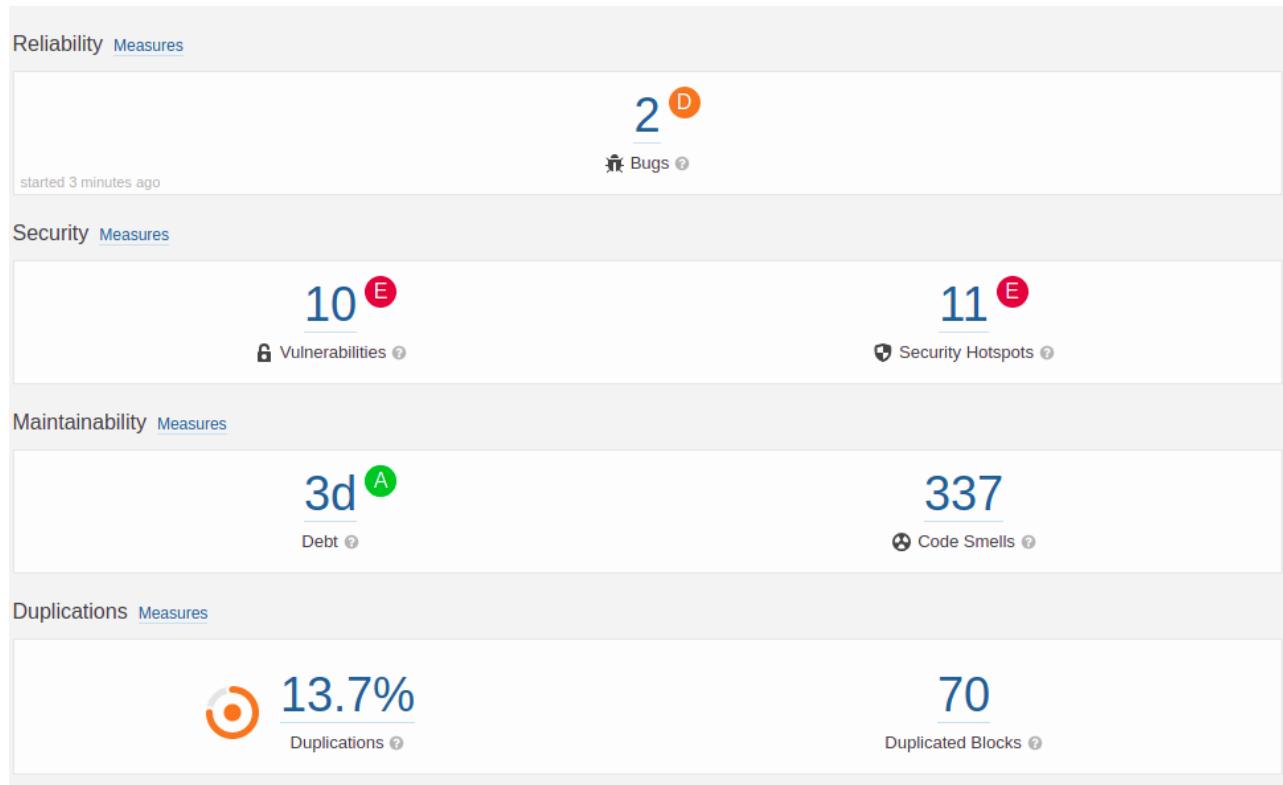
(Default) [Sonar way](#)

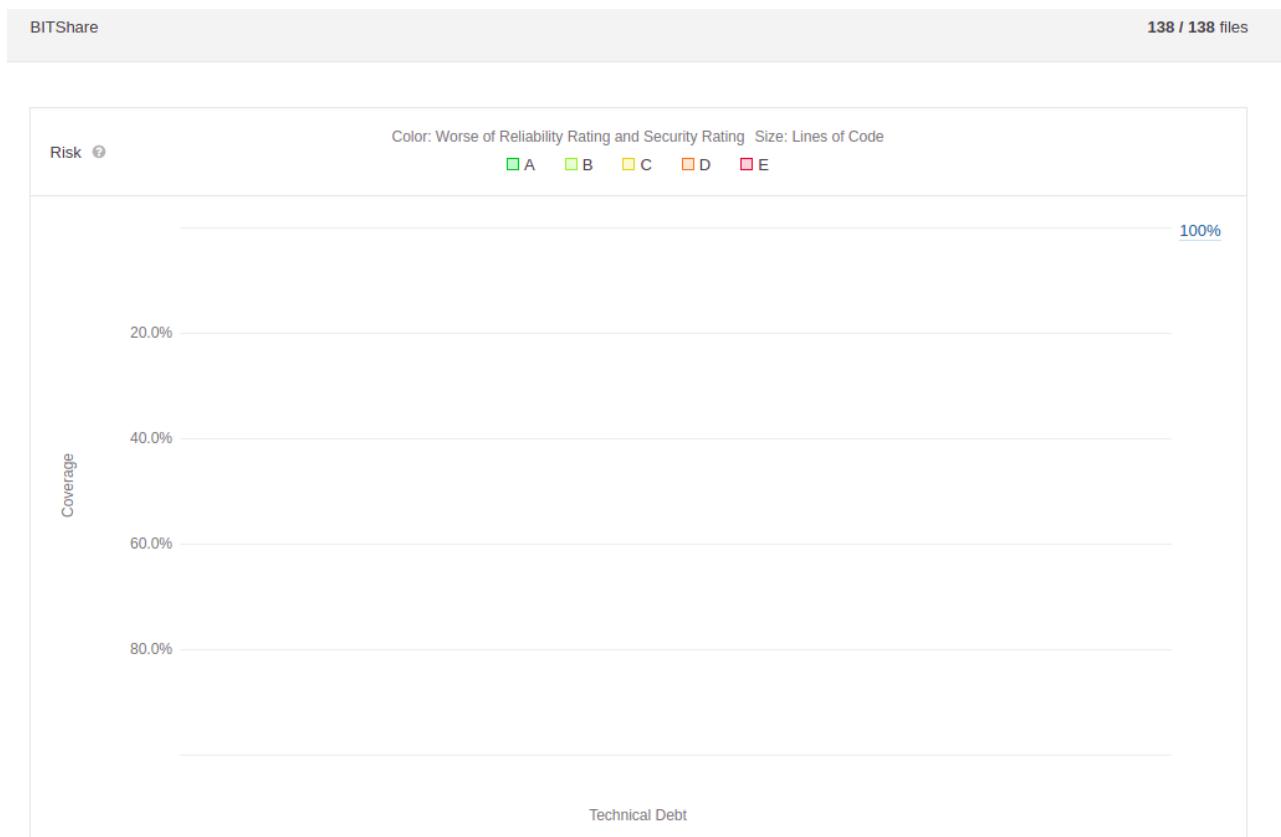
Quality Profiles

(CSS) [Sonar way](#)
(JavaScript) [Sonar way](#)
(HTML) [Sonar way](#)

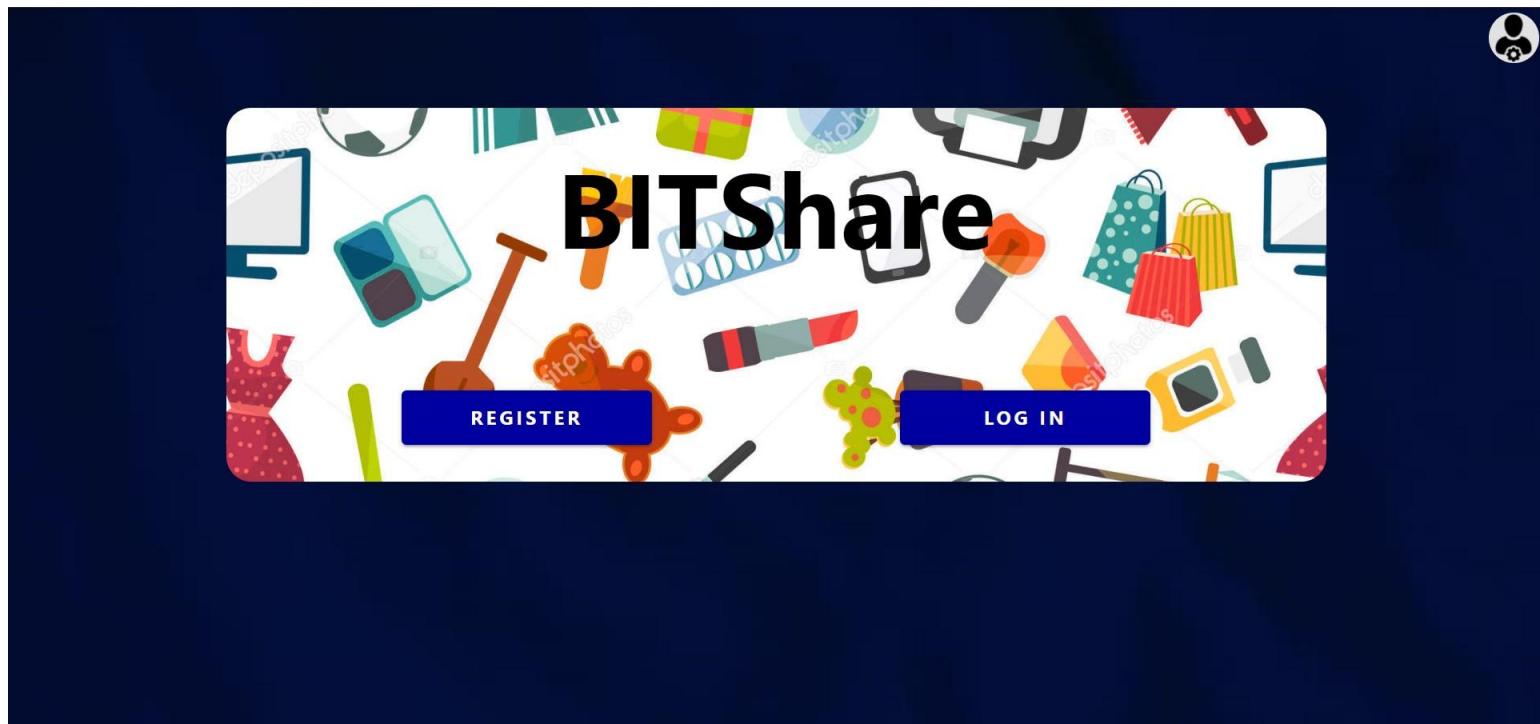
Last analysis method

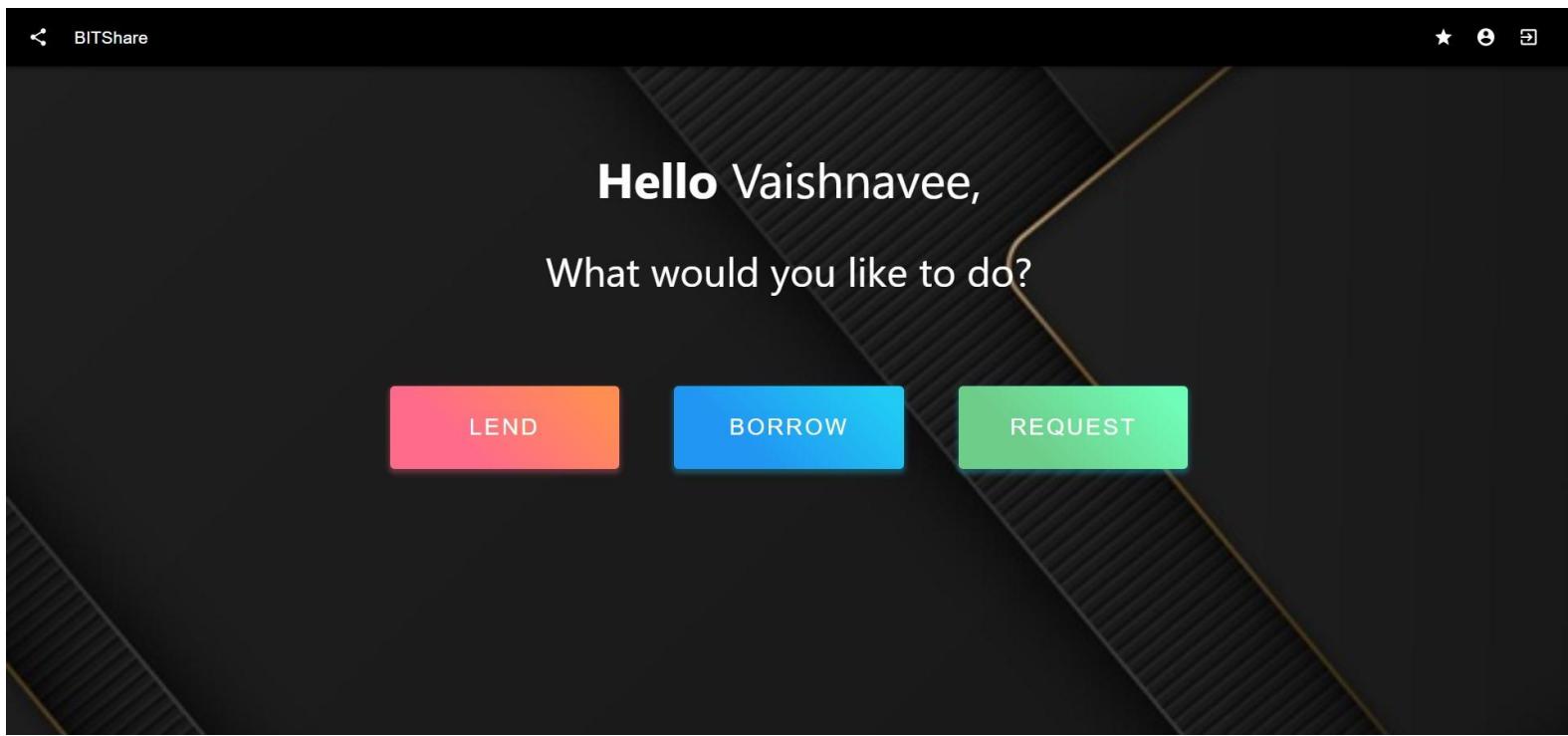
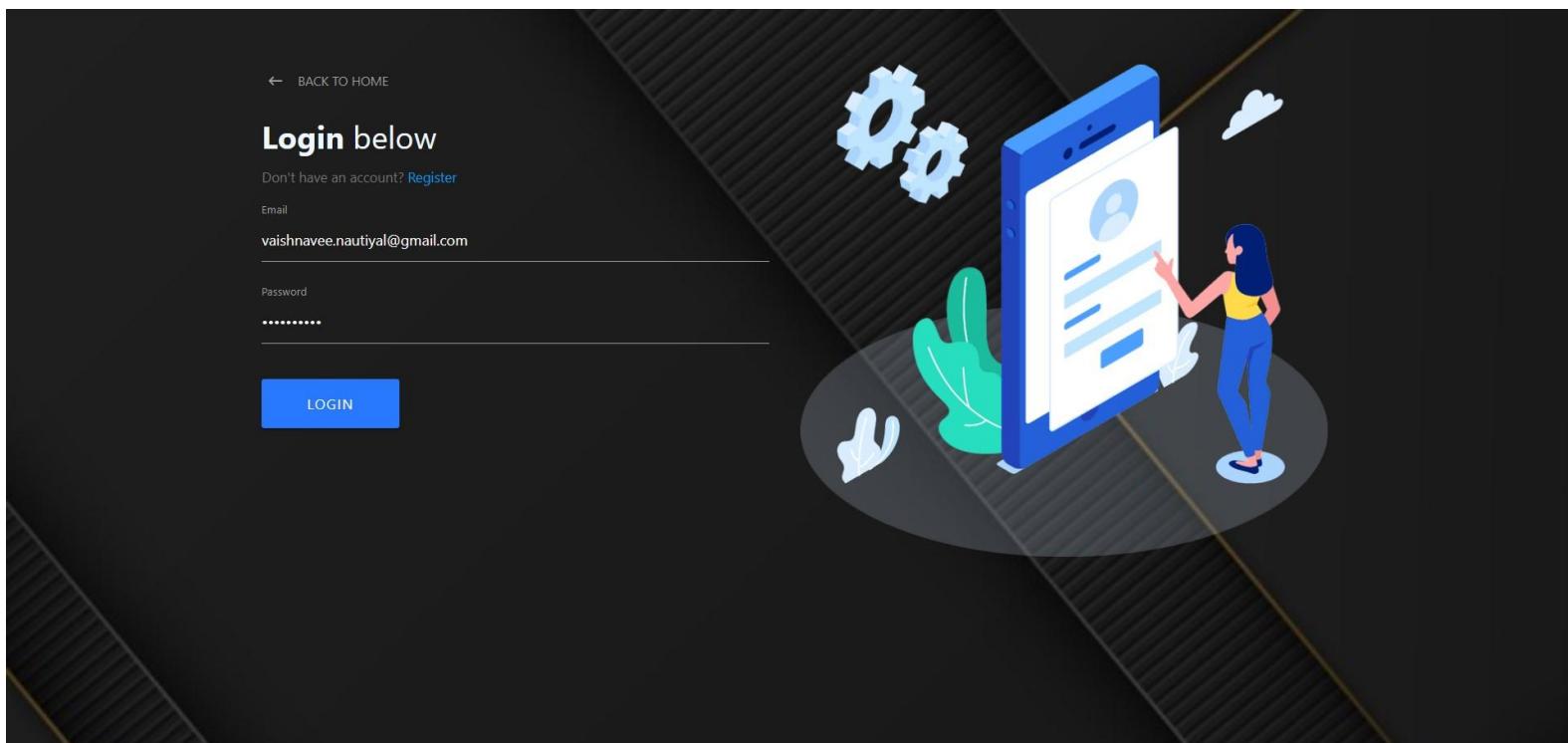
Analyzed by SonarCloud 

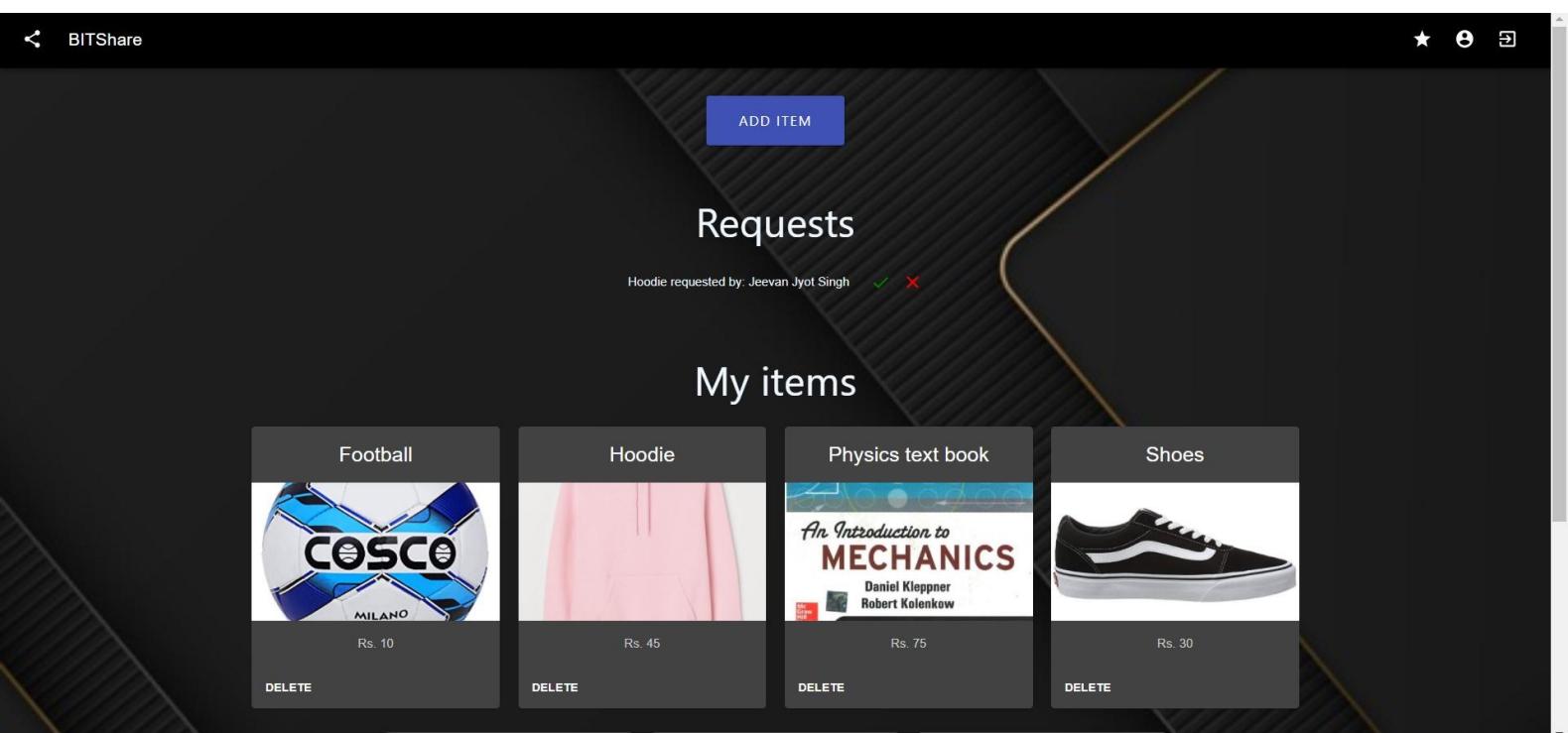
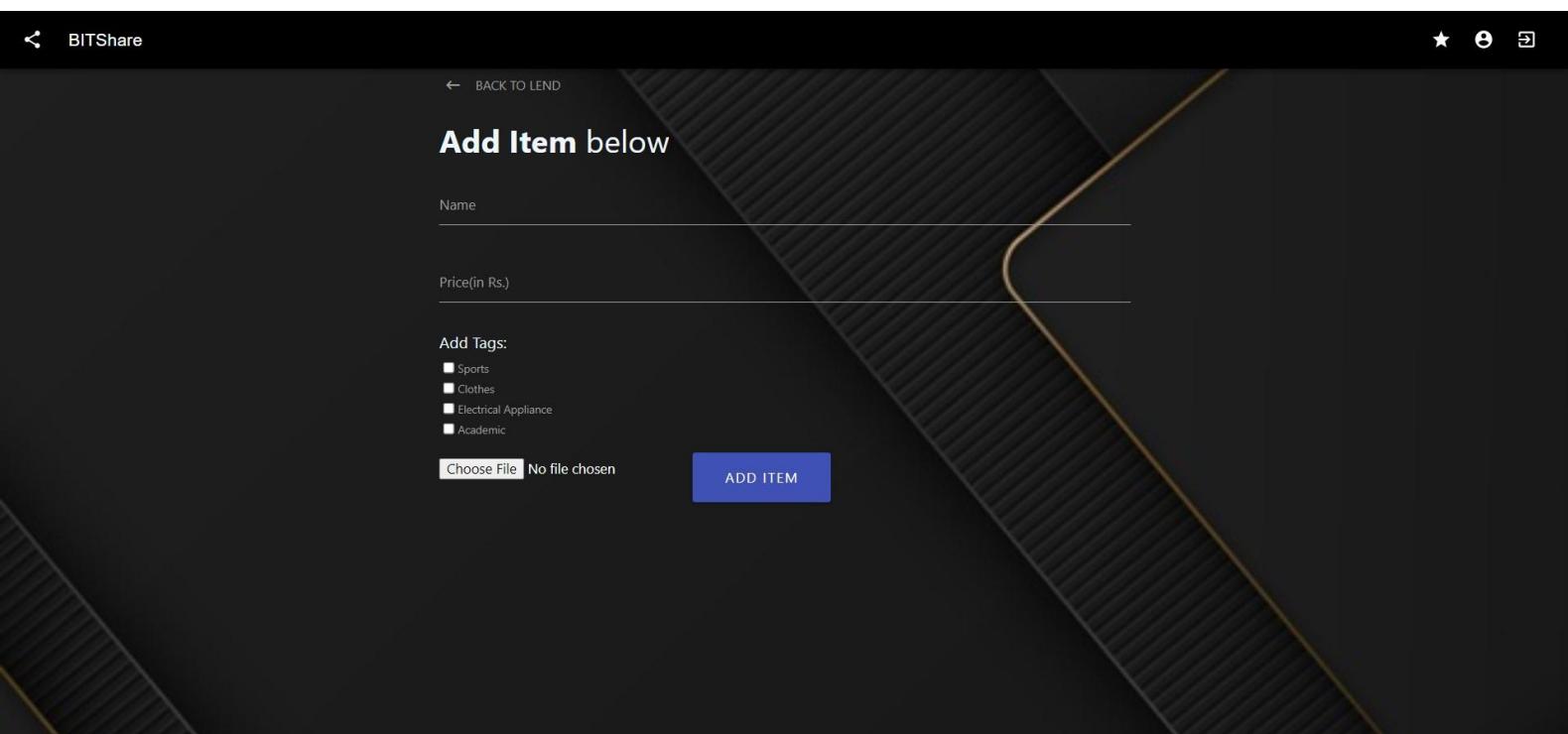




Appendix B - Sample screenshots

A registration form titled "Register below". It includes fields for Name (Vaishnavee Nautiyal), Email (vaishnavee.nautiyal@gmail.com), Hostel (Meera Bhawan), Room Number (408), Phone Number (9984565467), Password (*****), and Confirm Password (*****). A "SIGN UP" button is at the bottom. At the top left, there is a "BACK TO HOME" link and a "Log in" link.





BITShare

PENDING REQUESTS CURRENTLY BORROWED ITEMS BORROW AGAIN

Search

Search by tags:
Sports Clothes Electrical Appliance Academic

SEARCH

Football

Rs. 20
VIEW

Bucket

Rs. 10
VIEW

Sunglasses

Rs. 45
VIEW

Dumbells

Rs. 30
VIEW

BITShare

My Favourites

Football

Rs. 20
BORROW

Sunglasses

Rs. 45
BORROW

Dumbells

Rs. 30
BORROW

Calculator

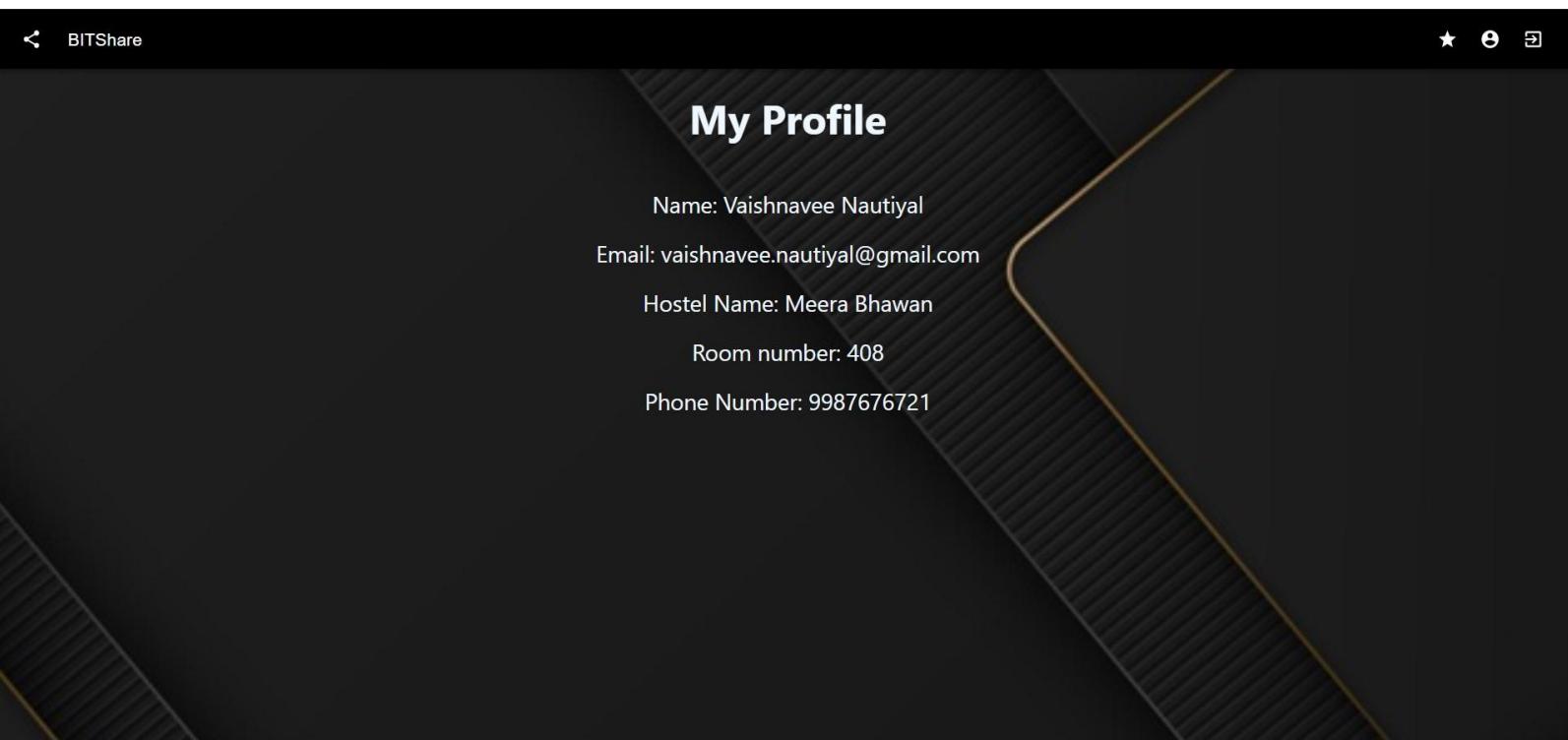
Rs. 20
BORROW

Beanbag

Rs. 30
BORROW

Kettle

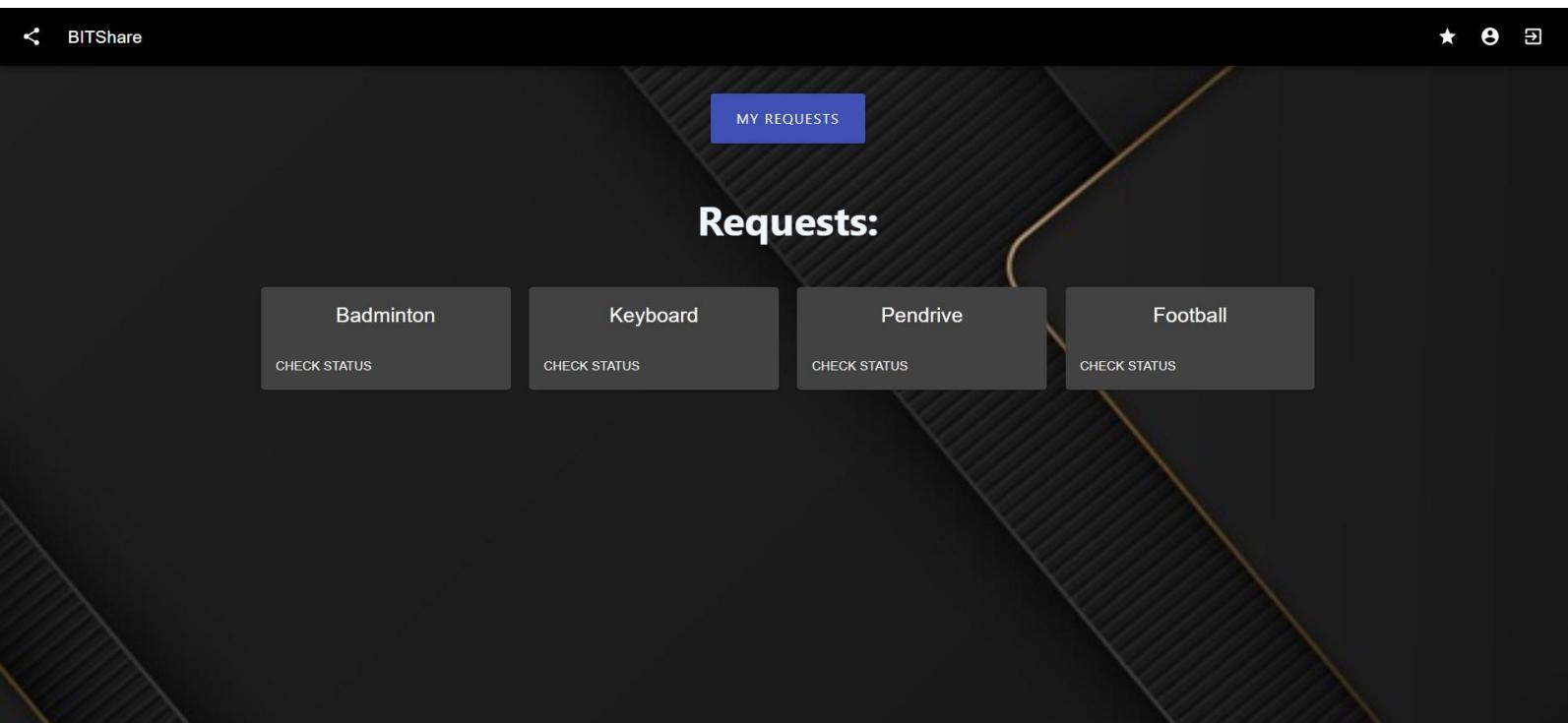
Rs. 40
BORROW



BITShare

My Profile

Name: Vaishnavee Nautiyal
Email: vaishnavee.nautiyal@gmail.com
Hostel Name: Meera Bhawan
Room number: 408
Phone Number: 9987676721

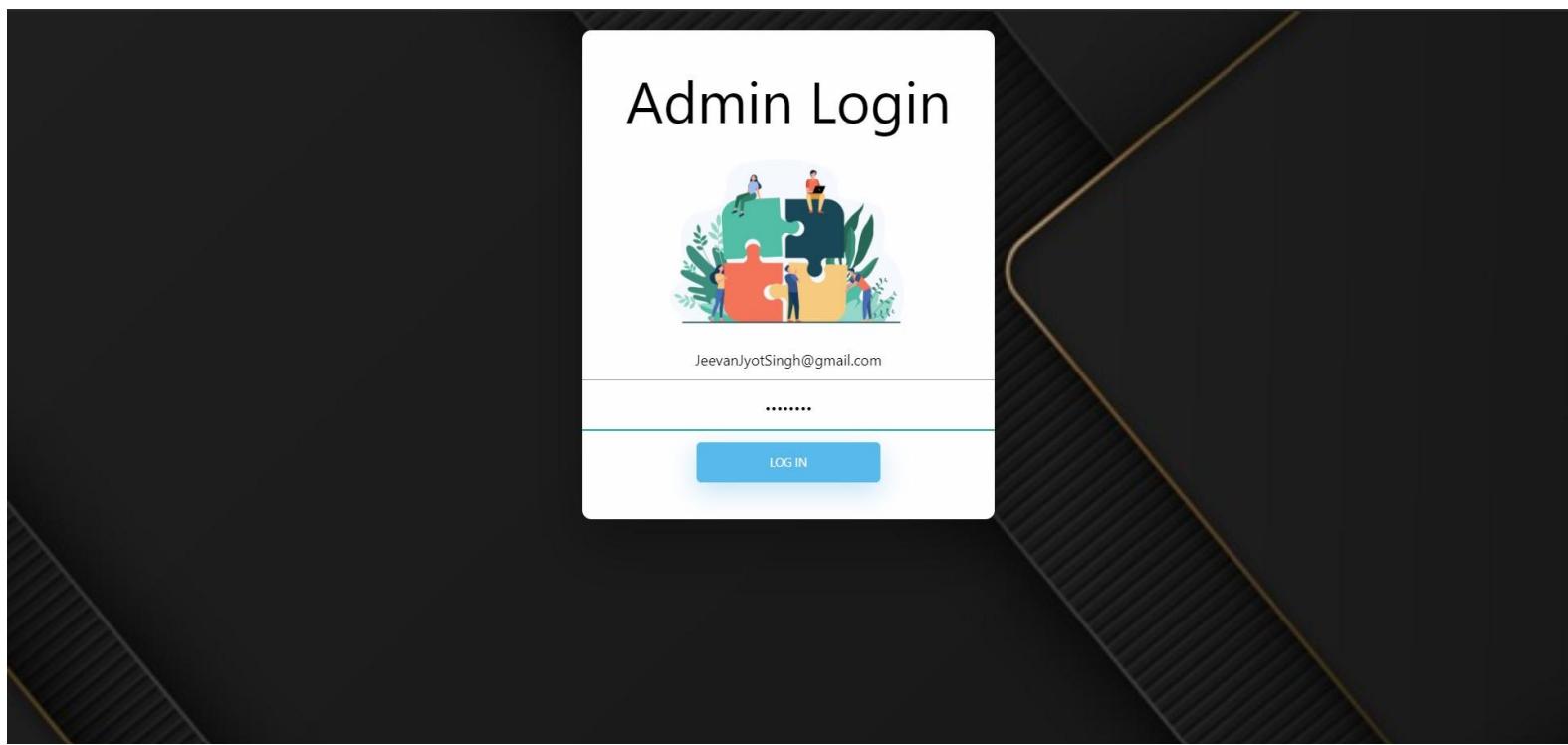
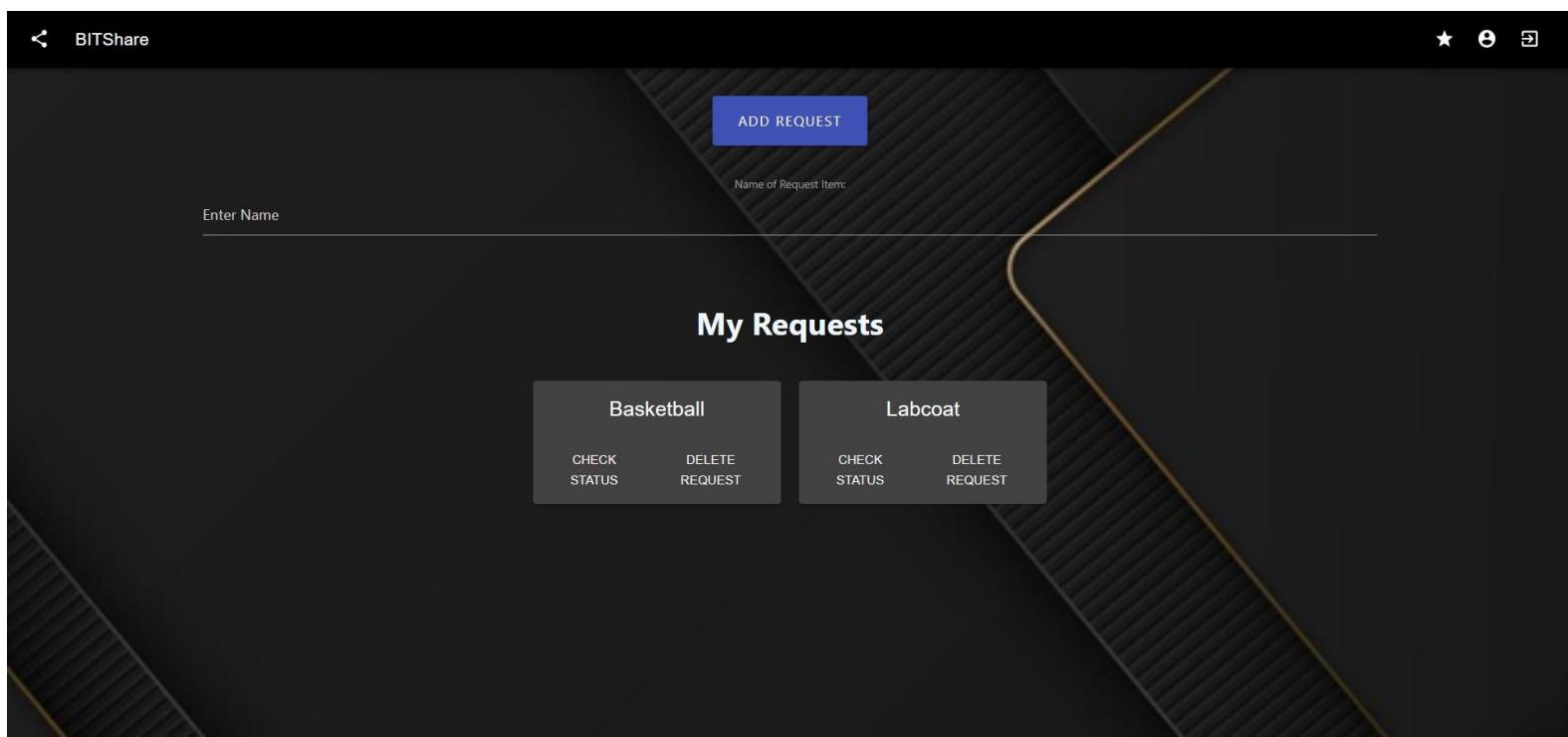


BITShare

MY REQUESTS

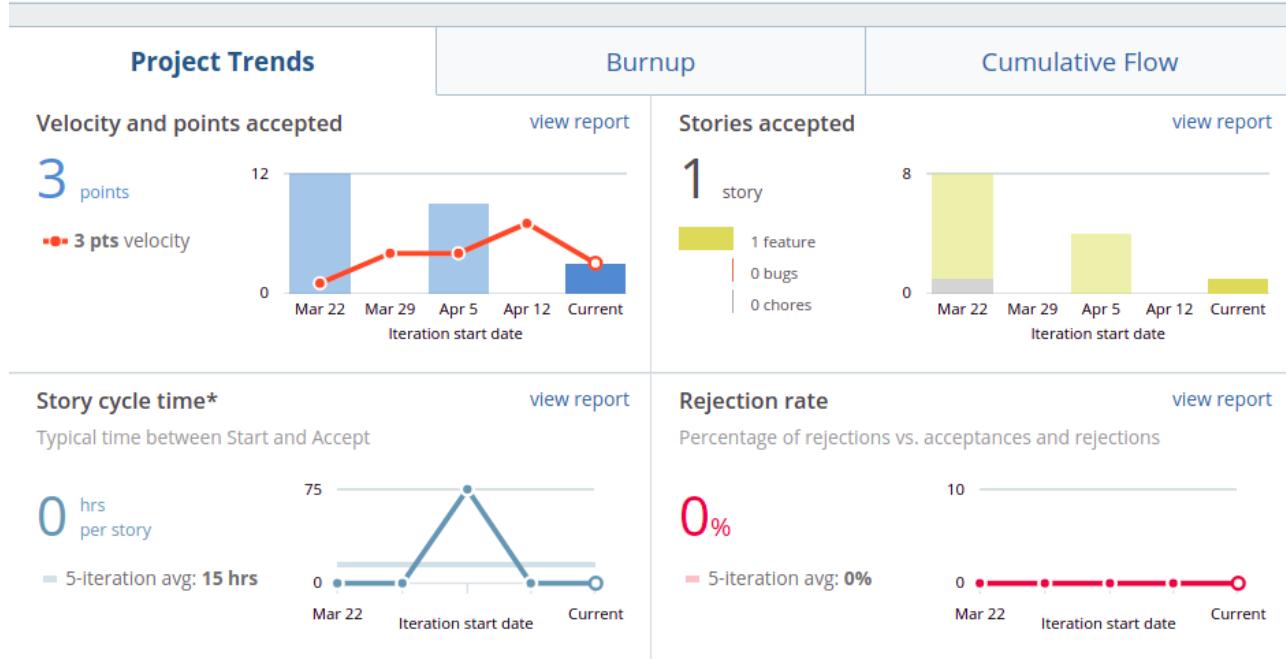
Requests:

Badminton	Keyboard	Pendrive	Football
CHECK STATUS	CHECK STATUS	CHECK STATUS	CHECK STATUS



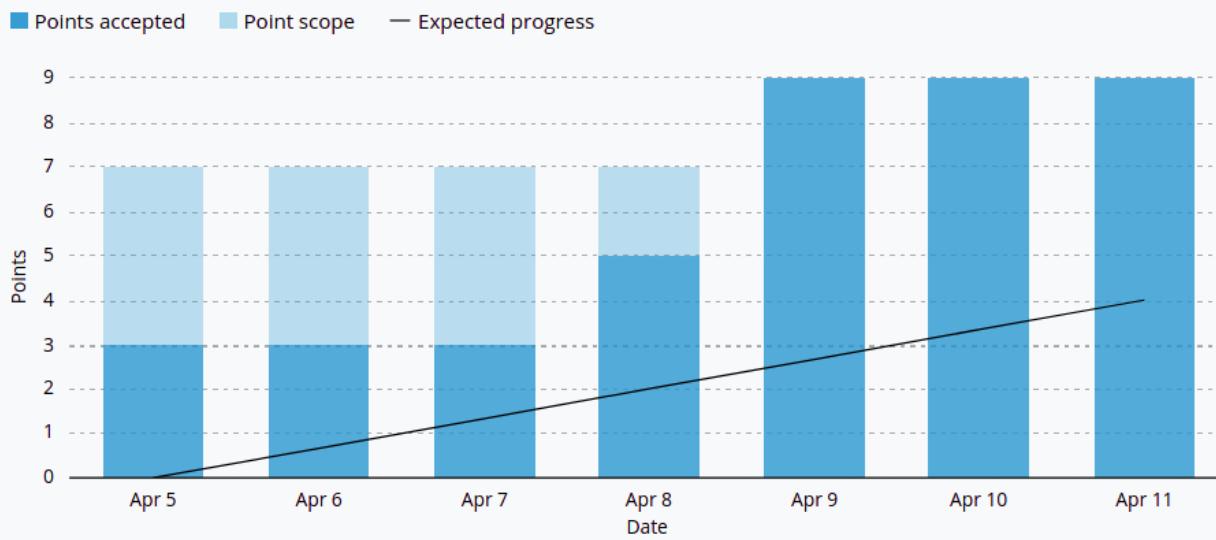
Appendix C – Project management

Project Overview



Iteration Burnup

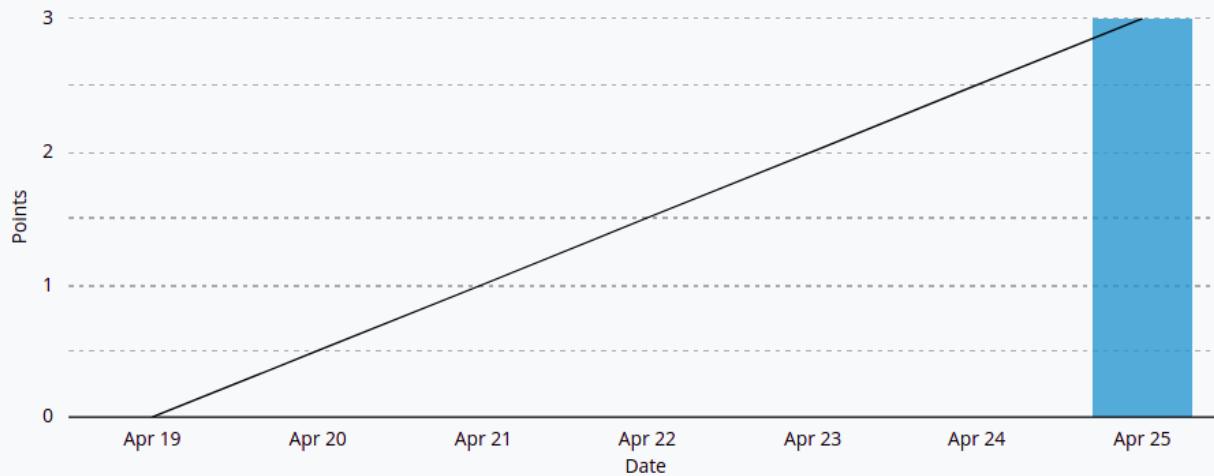
Point scope Story state flow



Iteration Burnup

Point scope Story state flow

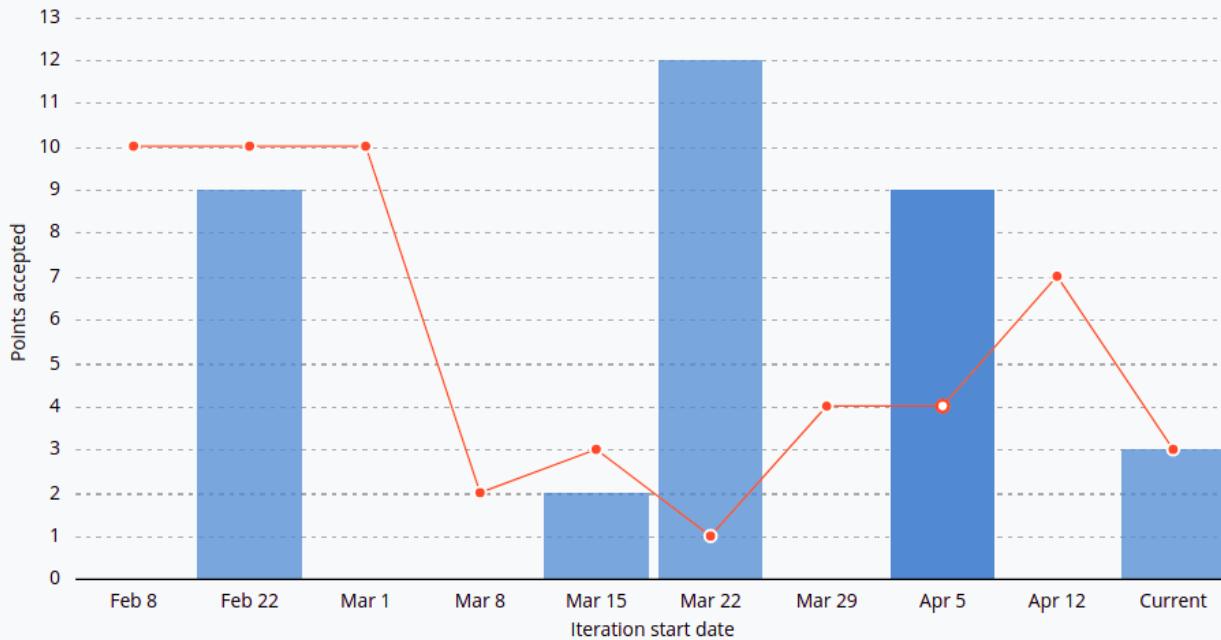
Points accepted Point scope — Expected progress



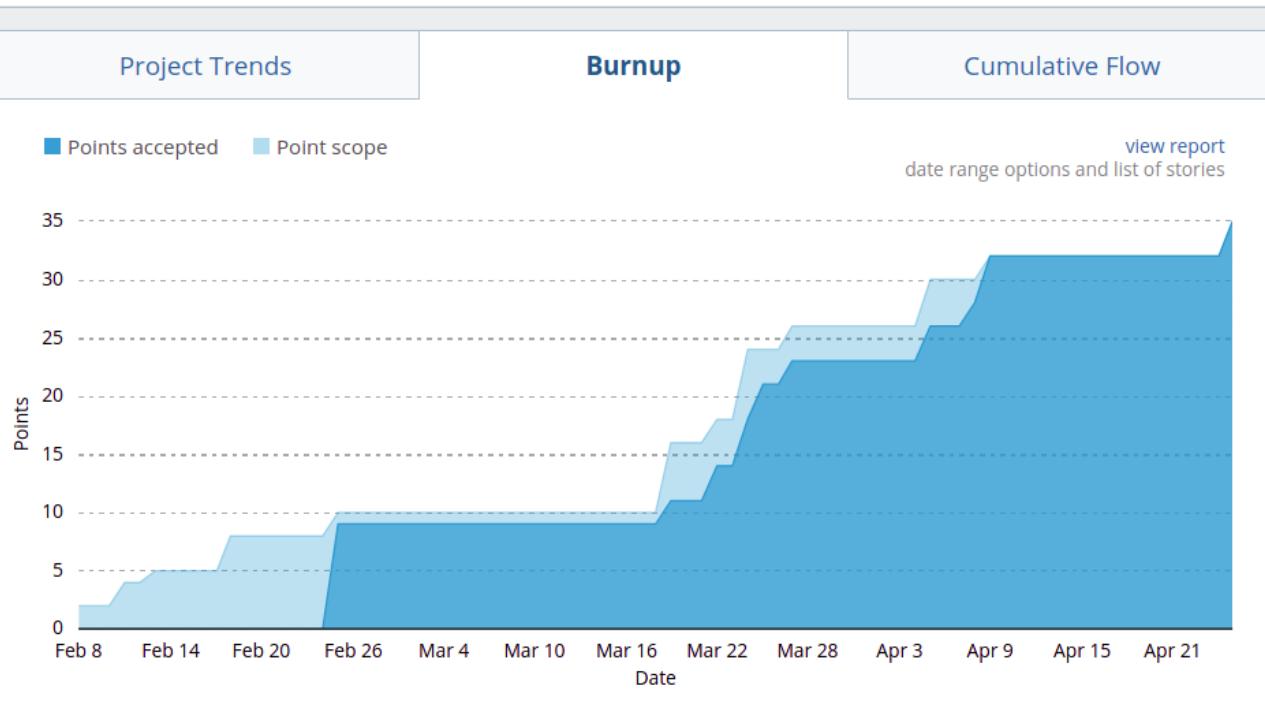
Points Accepted

Volatility: 141% - Standard Deviation: 4.2pts (based on past 3 iterations)

Accepted points Running velocity



Project Overview



Project Overview

